# PHYSICS QUESTION BANK

## UNIT I

### CHAP. 1: INTERFERENCE OF LIGHT

1) With a neat ray diagram explain interference in a parallel thin film for reflected light and derive the conditions for maximas and minimas. (5)
2) With the help of a neat ray diagram obtain the condition for interference maxima and minima due to transmitted light from a parallel thin film. (5)
3) Explain interference in wedge shaped film and hence derive expression for fringe width. Draw diagrams where necessary.
4) Show that the diameter of bright rings in Newton's Rings for reflected light is proportional to the square root of odd natural numbers.
5) Show that the diameter of dark rings in Newton's Rings for reflected light is proportional to the square root of natural numbers.
6) With neat ray diagram explain the experimental setup to determine radius of curvature of a plano-convex lens using Newton's Rings.
7) With neat ray diagram explain the experimental setup to determine wavelength of monochromatic light using Newton's Rings.
8) With neat ray diagram explain the experimental setup to determine refractive index of a liquid using Newton's Rings.
9) With neat diagrams explain how the phenomena of interference of light can be used to test surface smoothness.

### CHAP. 2: ULTRASONICS

10) With neat circuit diagram explain working of piezoelectric oscillator for production of ultrasonic waves.
11) With neat circuit diagram explain working of magnetostriction oscillator for production of ultrasonic waves.
12) Explain any 3 methods of detection of Ultrasonic Waves.
13) Write 5 properties of US waves.
14) Explain cavitation in liquids using ultrasonic waves? What are its applications?
15) Explain the following applications of US waves: (i) Detection of flaws in metals (ii) SONAR (iii) Echo-sounding (iv) Ultrasonic soldering (v) Ultrasonic cleaning (vi) Medical uses.
16) Explain the method to find velocity of USW in a liquid using acoustic diffraction grating.

## UNIT 2

### CHAP. 3: SEMICONDUCTORS

17) Based on the band theory of solids distinguish between the different types of materials. Give two examples of each.
18) Derive an expression for conductivity of a semiconductor in terms of mobility of charge carriers. (5)
19) What is Hall Effect? Obtain expression for Hall voltage and Hall Coefficient.
20) Explain the applications of Hall Effect.

### CHAP. 4: MAGNETISM

21) Explain the terms: Magnetising field, magnetization, magnetic susceptibility, Magnetic induction. Write their units.
22) Briefly explain the types of magnetic materials. Give 3 examples of each.
23) Explain paramagnetism. Give 5 properties of paramagnetic materials.
24) Explain ferromagnetism. Give 5 properties of ferromagnetic materials.
25) Give five points of difference between diamagnetic and paramagnetic substances.

26) With diagram explain hysteresis loop. What is retentivity and coercivity?
27) What are soft and hard magnetic materials? Give their properties and applications.
28) Draw a neat block diagram of CRO and explain its parts.

## UNIT 3

**CHAP. 5: LASERS**

29) Explain the process of stimulated emission of radiation and how it can be used for light amplification.
30) Describe Einstein's theory of stimulated emission and hence obtain the conditions necessary for light amplification.
31) What is population inversion and why is it necessary for light amplification? Why is population inversion sometimes called negative temperature state?
32) With diagram explain 3-level pumping scheme. What are its drawbacks?
33) With energy level diagram explain the 4-level pumping scheme.
34) Explain the differences between conventional & laser source of light.
35) What is an optical resonator and why is it required in a laser?
36) Explain the operation of laser using optical resonator.
37) With neat diagram explain construction & working of Ruby laser. What are its drawbacks?
38) With neat diagram explain construction & working of He-Ne laser?
39) Write the electronics, industrial, medical, military & scientific applications of lasers.

**CHAP. 6: FIBRE OPTICS**

40) With ray diagrams explain the phenomena of Total Internal Reflection.
41) Draw and explain structure of an optical fibre.
42) Draw and explain structure of an optical fibre cable.
43) Derive expression for Acceptance Angle of an optical fibre. What is acceptance cone?
44) Define Numerical Aperture of an optical fibre. What is its significance?
45) With neat diagrams explain the different types of optical fibres.
46) What is normalized frequency of an optical fibre? What is it's significance?
47) With block diagram explain the use of optical fibres in communication.
48) With neat diagram explain the working of a fiberscope.
49) What are the advantages of optical fibres over copper wires in communication?

## UNIT 4

**CHAP. 7: X-RAYS**

50) Explain the origin of characteristic and continuous X-rays and derive expression for cut-off wavelength in continuous X-ray spectra.
51) State Moseley's Law and explain its significance.
52) Write any five properties of X-rays.
53) Derive Bragg's Law of X-ray diffraction.
54) With neat diagram explain the working of Bragg's spectrometer.
55) Give the industrial, medical and scientific uses of X-rays.

**CHAP. 8: WAVE-PARTICLE DUALITY**

56) What is Compton effect? With neat diagram describe an experimental setup to study Compton effect.
57) Give an explanation of the Compton effect with respect to modified and un-modified component.
58) Derive expression for Compton shift. Discuss the various cases regarding scattering angle.
59) State de Broglie's hypothesis. What is de Broglie's wavelength? State properties of matter waves.
60) What are matter waves? Using the concept of matter waves obtain Bohr's condition for quantisation of angular momentum.
61) Describe an experiment (Davisson-Germer experiment) to prove that electrons behave like waves.